

# PATENT SPECIFICATION

802,046

Inventors: —ARTHUR GEORGE SWEETLAND and DENIS RICHARD CLARKE



Date of filing Complete Specification: Jan. 14. 1957

Application Date: Jan. 13, 1956. No. 1296156

Complete Specification Published: Sept. 24, 1958

Index at Acceptance:—Class 36, C3B(8 : 7X).

International Classification:—E02g.

## COMPLETE SPECIFICATION.

### Improvements relating to Section Insulators for Contact Wires of Electric Traction Systems.

We, BRITISH INSULATED CALLENDER'S CABLES LIMITED, a British Company, of Norfolk House, Norfolk Street, London. W.C.2, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the construction of section insulators for overhead contact wires of electric traction systems. Such fittings generally comprise a pair of end members each provided with or having secured thereto, means for anchoring the adjacent end of the contact wire and, in some cases, having a lower edge which forms a continuation of the contact wire, a central member or members for holding the end members in spaced relationship and electrically insulating them from one another. and a part carried by the central member or members, or by the end members, or by both central and end members, which serves as a guide for transferring the current collecting means from the end of one contact wire, or lower edge of the end member to which it is anchored, to the end of the other contact wire, or lower edge of the other end member, as the case may be.

The present invention is concerned with section insulators of the kind in which the two end members are united by a single insulating member or by one or more insulating members disposed above one or more other insulating members in such a manner that the lower member or members carry the tension exerted by the two contact wires whilst the upper member or members is or are in compression.

In accordance with the present invention the single insulating member, all of the in-

sulating members or only the insulating member or members under tension, are of resin bonded glass fibre. We prefer to use a polyester resin, e.g. that sold by Beck Koller under the Registered Trade Mark "Filabond" as "Filabond 1343", as the bonding resin but other thermosetting or cold-setting resins which set to a hard infusible condition can be used, e.g. phenolic resins and epoxy resins.

When a single insulating member is used this will generally be in the form of a beam attached to the end members in such a way that its upper part is in compression and its lower part is in tension. It can be made from a glass fibre cloth laminate, from glass fibre rovings or a mat impregnated and coated with the resin or from a dough moulding comprising a mass of short fibres randomly dispersed in a mass of resin.

We prefer the form of section insulator incorporating two insulating members, for example in the form of rods or tubes, the upper member being in compression and the lower member in tension. One form of rod which we prefer to use consists of a group or parallel groups of glass fibres or filaments embedded in a polyester resin the fibres of the group or each group being arranged parallel or substantially parallel to each other and to the rod. We prefer to manufacture such rods by coating a group of continuous glass filaments, disposed substantially parallel to one another, with a polyester resin in a liquid or semi-liquid reactive condition and then drawing the filaments through a die of diameter slightly greater than that of the rod required. Subsequently, the rods are ground to the finished sizes.

After the rod leaves the die the resin is

[Price 3s. 6d.]

allowed to harden at room temperature or it is baked to cause the resin to set, in accordance with the type of resin used.

An alternative form of rod which can be used for the upper (compression) member consists of a dough moulding comprising a mass of short fibres randomly dispersed in a mass of resin.

When tubes are used we prefer to make them by wrapping a continuous sheet of glass fabric of a width equal to the length of the rod, around a small diameter mandrel, mounting the mandrel in a mould, impregnating the glass fabric with a thermo-setting phenolic resin of the kind capable of resisting high temperatures and curing the resin in the normal way. After curing the mandrel is removed from the tube, subsequently the tube can be surface ground to provide a round and smooth finish and coated with an insulating varnish.

Our reason for preferring the polyester resins to the phenolic resins is that when using phenolic resins the fibre glass has first to be treated with a diluted resin which is then partially removed before the bonding resin is applied. Disadvantages of the epoxy resins are that, in general, curing times are longer and these resins are toxic.

The invention is applicable to section insulators of the kind in which the lower of the two insulating members, that is the tension member, has enlarged ends which are housed in recesses in the end members.

Section insulators of this kind are described in U.K. Patent Specifications Nos. 495,224 and 536,478.

Our preferred form of section insulator will be described with reference to the accompanying drawing which shows the insulator in elevation.

The insulator consists of two end members 1 and 2 which are united by upper and lower insulating members 3 and 4 of resin bonded glass fibre. Both members are solid rods the upper member 3 being of circular cross-section and having plain ends and the lower member 4 being of rectangular section with enlarged cylindrical ends 5. The ends 5 are housed in recesses of key-hole form in the end members 1 and 2 where they are clamped by drawing together the upper and lower walls of the recess by bolts 6. The lower or running edges of the end members 1 and 2 are in the form of renewable metal pieces of U-section 7 and 8 secured to the end members by screws. The renewable metal pieces 7 and 8 also support the insulating runner 9 which serves as a guide for the current collector in its passage between the end members 1 and 2.

The runner 9 is made of synthetic resin bonded asbestos fibre for example the phenolic resin bonded material sold under the Registered Trade Mark "Texolex". An

arcing shield 10 is attached to the insulating member 4 by means of a bracket 11. The end members 1 and 2 are formed with lugs 12 and 13 to which clamps for anchoring the ends of the two lengths of contact wire are bolted.

#### WHAT WE CLAIM IS:—

1. A section insulator, for an overhead contact wire of an electric traction system, comprising a pair of end members, each provided with or being adapted to carry means for anchoring the adjacent end of the contact wire, an insulating member of resin bonded glass fibre uniting the two end members and a part carried by the insulating member, or by the end members, or by both the insulating member and the end members, which serves as a guide for the current collector in its passage between the end members.

2. A section insulator, for an overhead contact wire of an electric traction system, comprising a pair of end members, each provided with or being adapted to carry means for anchoring the adjacent end of the contact wire, one or more insulating members disposed above one or more other insulating members of resin bonded glass fibre, these insulating members uniting the two end members in such a manner that the lower member (or members) carries the tension exerted by the two contact wires whilst the upper member (or members) is in compression, and a part carried by one or more of the insulating members, or by the end members, or by one or more of the insulating members and the end members, which serves as a guide for the current collector in its passage between the end members.

3. A section insulator in accordance with Claim 2 in which all of the insulating members uniting the end members are of resin bonded glass fibre.

4. A section insulator, for an overhead contact wire of an electric traction system, comprising a pair of end members, each provided with or being adapted to carry means for anchoring the adjacent end of the contact wire, two rods or tubes of insulating material, arranged one above the other, uniting the two end members in such a manner that the lower rod or tube carries the tension exerted by the two contact wires whilst the upper rod or tube is in compression, at least the lower rod or tube being of resin bonded glass fibre, and a part carried by the lower rod or tube, or by the end members, or by both the lower rod or tube and the end members, which serves as a guide for the current collector in its passage between the end members.

5. A section insulator, for an overhead contact wire of an electric traction system, comprising a pair of end members, each provided with or being adapted to carry means for anchoring the adjacent end of the contact

70

75

80

85

90

95

100

105

110

115

120

125

130

wire, an upper insulating rod or tube and a lower resin bonded glass fibre rod with enlarged ends, uniting the end members, the enlarged ends of the lower rod being housed 5 in recesses in the end members and the arrangement being such that the lower rod carries the tension exerted by the contact wires and the upper rod or tube is in compression, and a part carried by the end members which serves as guide for the current 10 collector in its passage between the end members.

6. A section insulator in accordance with any preceding claim in which the glass fibres are bonded with a polyester resin. 15

7. A section insulator substantially as hereinbefore described with reference to and shown in the accompanying drawing.

H. H. DAKER,  
Agent for the Applicants.  
21 Bloomsbury Street.  
London, W.C.1.

### PROVISIONAL SPECIFICATION.

#### Improvements relating to Section Insulators for Contact Wires of Electric Traction Systems.

We, BRITISH INSULATED CALLENDER'S CABLES LIMITED, a British Company, of Norfolk House, Norfolk Street, London, W.C.2, do hereby declare this invention to be described in the following statement:—

This invention relates to the construction 25 of section insulators for overhead contact wires of electric traction systems. Such fittings generally comprise a pair of end members each provided with or having secured thereto, means for anchoring the adjacent 30 end of the contact wire and, in some cases, having a lower edge which forms a continuation of the contact wire, a central member or members for holding the end members in spaced relationship and electrically insulating 35 them from one another, and a part carried by the central member or members, or by the end members, or by both central and end members, which serves as a guide for transferring the current collecting means 40 from the end of one contact wire, or lower edge of the end member to which it is anchored, to the end of the other contact wire, or lower edge of the other end member, as the case may be.

The present invention is concerned with 45 section insulators of the kind in which the two end members are united by a single insulating member or by one or more insulating members disposed above one or more other insulating members in such a manner 50 that the lower member or members carry the tension exerted by the two contact wires whilst the upper member or members is or are in compression.

In accordance with the present invention 55 the insulating member or both members is or are of resin bonded fibre glass. We prefer to use a polyester resin, e.g. that sold by Beck Koller under the Registered Trade Mark "Filabond" as "Filabond 1343", as the bonding resin but other thermo-setting or cold-setting resins which set to a hard in-

fusible condition can be used, e.g. phenolic resins and epoxy resins.

When a single insulating member is used this will generally be in the form of a beam attached to the end members in such a way that its upper part is in compression and its lower part is in tension. It can be made from a glass fibre cloth laminate, from glass fibre rovings or a mat impregnated and coated with the resin or from a dough moulding comprising a mass of short fibres randomly dispersed in a mass of resin. 65

We prefer the form of section insulator incorporating two insulating members, for example in the form of rods or tubes, the upper member being in compression and the lower member in tension. One form of rod which we prefer to use consists of a group or parallel groups of glass fibres or filaments embedded in a polyester resin the fibres of the group or each group being arranged parallel or substantially parallel to each other and to the rod. We prefer to manufacture such rods by coating a group of continuous glass filaments, disposed substantially parallel to one another, with a polyester resin in a liquid or semi-liquid reactive condition and then drawing the filaments through a die of diameter slightly greater than that of the rod required. Subsequently, the rods are ground to the finished sizes. 70

After the rod leaves the die the resin is allowed to harden at room temperature or it is baked to cause the resin to set, in accordance with the type of resin used. 75

An alternative form of rod which can be used for the upper (compression) member 100 consists of a dough moulding comprising a mass of short fibres randomly dispersed in a mass of resin.

When tubes are used we prefer to make them by wrapping a continuous sheet of glass fabric of a width equal to the length of the rod, around a small diameter mandrel, 105

- mounting the mandrel in a mould, impregnating the glass fabric with a thermo-setting phenolic resin of the kind capable of resisting high temperature and curing the resin in the normal way. After curing the mandrel is removed from the tube, subsequently the tube can be surface ground to provide a round and smooth finish and coated with an insulating varnish.
- Our reason for preferring the polyester resins to the phenolic resins is that when using phenolic resins the fibre glass has first to be treated with a diluted resin which is then partially removed before the bonding resin is applied. Disadvantages of the epoxy resins are that, in general, curing times are longer and these resins are toxic.
- The invention is applicable to section insulators of the kind in which the lower of

the two insulating members, that is the tension member, has enlarged ends which are housed in recesses in the end members. A section insulator of this kind is described in U.K. Patent Specification No. 495,224. Our preferred forms of section insulator are substantially the same as those described in that Specification except that the upper insulating member is a rod or tube of resin bonded fibre glass made by one of the methods described above and the lower member or tension member is of rectangular section with enlarged ends.

H. H. DAKER,  
Agent for the Applicants.  
Surrey House. Temple Place.  
London, W.C.2.

Abingdon : Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1958.  
Published at The Patent Office, 25, Southampton Buildings, London. W.C.2,  
from which copies may be obtained.

802,046 COMPLETE SPECIFICATION

1 SHEET This drawing is a reproduction of  
the Original on a reduced scale.

